Climate change calls for a fresh approach to water woes

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The Everglades National Park, the largest subtropical wilderness in the United States, is home to 16 different species of wading birds and rare and endangered species like the manatee, the American crocodile and the Florida panther. But the area is also home to humans. The park is a portion of a larger wetland ecosystem, more than half of which has been converted into agricultural production or urban developments. The ecosystem must provide both flood protection and supply water for the park, the agricultural interests and South Forida's rapidly growing

population of nearly eight million people.

Meanwhile, a federal-state initiative to address this challenge, known as the Comprehensive Everglades Restoration Plan, is "sort of stuck in the muddle," says Lance Gunderson, chair of Emory's Department of Environmental Sciences. The plan was authorized in 2000 but it hasn't made much progress.

Climate change throws another wrench in the works, affecting the Everglades and other large watersheds across the United States in new and unpredictable ways. Extreme weather events and rising sea levels, combined with a growing population, will lead to "more intense arguments" about already contested issues of water quality and water usage, Gunderson says.

Gunderson, a wetlands ecologist, recently partnered with Barbara Cosens, a legal scholar at the University of Idaho, to lead an interdisciplinary team of researchers in a project to assess the adaptive capacity of six major U.S. water basins to changing climates. In addition to the Everglades, the basins include the Anacostia, the Columbia, the Klamath, the Platte and the Rio Grande rivers. The project was funded by NSF Social-Ecological Synthesis Center at the University of Maryland.

"Climate change is a game changer when it comes to the management of these regional-scale water systems across the country," Gunderson says. "These systems are managed through assumptions about climate and models that are based on averages. Now, managers are struggling to adapt to more extremes—like earlier snow melts, more floods and droughts, and more intense storms."

Even without extreme events, water management is complex. The Everglades, for example, is not just an issue of restoring biological

diversity. It's an economic problem that often puts government agencies, agriculture, developers, residents, and environmental groups at loggerheads.

"These are complex problems and we can't plan or analyze our way out of them," Gunderson says. "We have to learn our way out of them."

Instead of relying on the court system or government policies, he says people need to come together in organic, self-organized ways for "adaptive governance." Such approaches can forge new paths through a problem by trying small experiments to see if they work.

The Klamath River basin, for instance, benefited by farmers and Native Americans coming together informally, instead of going to court, to talk about possible ways to reallocate water to satisfy both sides.

"Informal, adaptive management lets you learn while you're doing," Gunderson says. "It allows people without resources to be engaged in the process. Change happens when little groups of people work together collectively on wicked problems that have no easy solutions or easy answers."

As chair of Environmental Sciences Gunderson is also confronted with the problem of how to train students to deal with the issues that will face them when they graduate. The department is blending facets of political science, ecology, sociology, biology, geology and health into its curriculum.

"These specialties are at the intersection of major environmental problems and we are trying to build some integrated understanding around them," Gunderson says. "Our world is becoming more complex and we want students to have the skills to confront that complexity."

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